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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,240	10/24/2003	David W. Abraham	YOR920030477US1	1429

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Moser, Patterson & Sheridan
Suite 100
595 Shrewsbury Avenue
Shrewsbury, NJ 07702

EXAMINER	
SCHINDLER, DAVID M	

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 01/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/693,240	ABRAHAM, DAVID W.	
	Examiner	Art Unit	
	David Schindler	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 18-21* is/are rejected.

7)☒ Claim(s) *15-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Bot Ledynh
Primary Examiner

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the communication received 10/24/2005.

Response to Arguments

2. Applicant's arguments filed 10/24/2005 have been fully considered but they are not persuasive.

3. With respect to applicant's arguments in paragraph 3 of page 2 of the Remarks, the Examiner respectfully disagrees. Applicant argues "The Examiner's attention is directed to the fact that KE1 and KE2 ... fail to tech, show, or suggest heating a probe that is comprised of a material having temperature-dependent magnetic properties" on lines 1-3 of the above paragraph. Column 22, Lines 49-52 states "By comprising at least the tip of the conductive probe 80 located at the tip of the cantilever 82 with a conductive magnetic material 99 having a large magnetic permeability such as Co, Ni, Fe as shown in FIG. 14 ..." The Examiner notes that it is a property of Co, Ni, and Fe to have temperature dependent magnetic properties. The Examiner has included a reference from the encyclopedia Wikipedia.org entitled "Ferromagnetism" which discloses information regarding ferromagnetism, which shows Co, Ni, and Fe in the table on the right as these materials are ferromagnetic. Specifically, the Examiner notes the seventh paragraph under the heading Physical Origin which states, "As the temperature increases, thermal oscillation, or entropy, competes with the ferromagnetic tendency for dipoles to align. When the temperature rises beyond a certain point, called the Curie temperature, there is a second-order phase transition and the system can no longer maintain a spontaneous magnetization, although it still responds

paramagnetically to an external field. Below that temperature, there is a spontaneous symmetry breaking and random domains form (in the absence of an external field). The Curie temperature itself is a critical point, where the magnetic susceptibility is theoretically infinite and, although there is no net magnetization, domain-like spin correlations fluctuate at all lengthscales." Ferromagnetic materials are temperture dependent as disclosed above. At the very least, they are temperature dependent in that once heated to a point above the curie tempearture, they no longer act ferromagnetically and instead act paramagnetically. A copy of the above noted reference as well asl a reference discussing the temperature dependence of ferromagnetic materials are provided on the Notice of References Cited (PTO-892). With regard to heating the probe, please see the rejection below as well as column 17, lines 62-64 of the Kado reference used in the rejection below.

With regard to applicant's mentioning of a magnetic force microscope (MFM) in the last paragraph of page 2 of the Remarks, as well as in the first full paragraph of page 3 of the Remarks, the Examiner notes in response to applicant's arguments, the recitation magnetic force microscopy in Claim 1 and magnetic force microscope in Claims 18 and 20 has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535

F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

In the second full paragraph of page 3 of the Remarks, applicant argues "By contrast, Kado only teaches changing the properties of the "sample" (in Kado's case, a recording medium) by heating. That is, the recording medium is, in some embodiments, coated with a magnetic material (Tb, Fe or Co) whose magnetization direction is manipulated by heating. This is not the same as changing the properties of the probe by heating." To this, the Examiner notes that the above features are not claimed. The claims merely recite, to use claim 1 as an example, "providing a probe comprising a material having temperature-dependent magnetic properties, the probe having a tip adapted for observing a surface of a sample; and heating the probe." Furthermore, the Examiner disagrees with applicant's statement above and notes that Kado does heat a probe tip as seen in column 17, lines 62-64.

With respect to the third full paragraph of page 3 of the Remarks, the Examiner respectfully disagrees. First, the Examiner notes that the Claims do not recite varying the magnetic properties of the probe tip by heating as argued by applicant in lines 1-2 of the above noted paragraph. Furthermore, the Examiner notes that, as shown above, ferromagnetic materials are temperature dependent and that heating them will vary their magnetic properties.

With respect to the last paragraph of page 3 of the Remarks, as well as lines 1-4 of page 4 of the Remarks, the Examiner respectfully disagrees. With regard to applicant's argument in lines 2-4 of page 4 of the Remarks, the Examiner directs

applicant to paragraph 3 of this Office Action which discusses the temperature-dependence of ferromagnetic materials. With regard to applicant's argument in lines 3-4 of page 4 of the Remarks that KE2 saying nothing about the magnetic properties of the probe tip being affect by temperature, the Examiner notes that temperature-dependence is a property of ferromagnetic materials, and directs applicant's attention to paragraph 3 of this Office Action.

With respect to the Claim 6 section starting in the middle of page 4 of the Remarks, the Examiner respectfully disagrees and directs applicant to paragraph 3 of this Office Action.

With respect to the Claim 9 section found on page 5 of the Remarks, the Examiner respectfully disagrees and directs applicant to paragraph 3 of this Office Action.

With respect to the Claim 13 section found at the top of page 6 of the Remarks, the Examiner respectfully disagrees and directs applicant to paragraph 3 of this Office Action.

With respect to the Claims 15-17 section starting at the bottom of page 6 of the Remarks, the Examiner respectfully disagrees and directs applicant to paragraph 3 of this Office Action.

With respect to applicant's arguments in lines 1-3 of page 8 of the Remarks, the last three lines of the first full paragraph of page 8 of the Remarks, the second full paragraph of page 8 of the Remarks, and lines 1-4 of page 9 of the Remarks, the Examiner respectfully disagrees. The Examiner notes that no range or definable

limitation has been introduced into the claims to define a low Curie temperature. The term "low" is a relative term. The Examiner notes that Co has a Curie temperature of 1388 K, and that Ni has a Curie temperature of 627 K (see the provided Wikipedia.org reference entitled "Ferromagnetism" for a chart of values of various materials and their associated Curie temperature). As both of these materials are disclosed in the Kado reference (see column 22, lines 48-52), the Examiner is interpreting that Ni is a low Curie temperature material compared to Co. With regard to lines 1-4 of page 9 of the Remarks, the Examiner notes that the claims do not recite or require any preferred value or range for the Curie temperature.

4. Applicant's arguments, see the Claims 20-21 section starting at the bottom of page 9 of the Remarks and ending at the top of page 11, filed 10/24/2005, with respect to the rejection(s) of claim(s) 20 and 21 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of See the rejection below.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-6, 10, 11, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kado et al. (6,101,164) Embodiment One (KE1) in view of Kado et al. (6,101,164) Embodiment Two (KE2).

As to Claim 1,

KE1 discloses providing a probe (80) including a material (99) having temperature-dependent magnetic properties (Column 22, Lines 49-55), the probe having a tip adapted for observing a surface of a sample ((Column 21, Lines 60-62) and (Column 22, Lines 6-8)).

KE1 does not explicitly disclose heating the probe.

KE2 discloses heating a probe with a laser (Column 17, Lines 62-64)

It would have been obvious to a person of ordinary skill in the art to modify KE1 to include heating a probe including a material having temperature-dependent magnetic properties given the above disclosure and teaching of KE2 in order to extend the life of the probe (Column 6, Lines 31-36).

As to Claim 2,

KE1 discloses the probe tip is tapered (Figure 12).

As to Claim 3,

KE1 does not explicitly disclose heating the probe using a time-varying heat source.

KE2 discloses heating the probe using a time-varying heat source (Laser) (Column 17, Lines 60-62).

It would have been obvious to a person of ordinary skill in the art to modify KE1 to include heating the probe using a time-varying heat source as taught by KE2 in order to use a laser to heat the probe.

As to Claim 4,

KE1 discloses the probe is coated with the material having temperature-dependent magnetic properties (Column 22, Lines 49-52).

As to Claim 5,

KE1 discloses the probe includes a ferromagnetic material (Column 22, Lines 49-52).

As to Claim 6,

KE1 discloses the ferromagnetic material has a low Curie temperature (Column 22, Lines 49-52).

As to Claim 10,

KE1 discloses a tapered probe tip (Figure 12).

KE1 does not explicitly disclose focusing a laser on the tapered probe tip.

KE2 discloses focusing a laser on the tapered probe tip (Figure 8).

It would have been obvious to a person of ordinary skill in the art to modify KE1 to include focusing a laser on the tapered probe tip as taught by KE2 in order to ensure that the part of the probe closest to the surface below it is sufficiently heated.

As to Claim 11,

KE1 does not disclose modulating the laser power that heats up the probe tip.

KE2 discloses modulating the laser power that heats up the probe tip (Column 17, Lines 60-64).

It would have been obvious to a person of ordinary skill in the art to modify KE1 to include modulating the laser power that heats up the probe tip as taught by KE2 in order to improve the magnetic sensitivity of the probe tip.

As to Claim 12,

KE1 discloses providing a two-conductor electrode (99) to the probe tip (80) ((Figure 14) and (Column 22, Lines 49-51)).

As to Claim 14,

KE1 discloses a magnetic coating (99) on the tip of the probe (Column 22, Lines 49-52).

In the rejection of Claim 1, heating a probe including a material having temperature-dependent magnetic properties was taught. It was not disclosed that the magnetic coating on the tip was heated from within a core of the probe. However, it would be a rearrangement of parts to use the disclosed laser to heat the magnetic coating from inside or outside the probe (2144.04). A person of ordinary skill in the art

would be motivated to heat the magnetic coating on the tip from within a core of the probe in order to have even heating of the probe.

4. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kado et al. (6,101,164) Embodiment One (KE1) in view of Kado et al. (6,101,164) Embodiment Two (KE2) and in further view of Kitazawa et al. (2002/0178799).

As to Claim 7,

KE1 in view of KE2 does not disclose replacing the ferromagnetic material of the probe with a ferrimagnetic material.

Kitazawa et al. discloses forming a ferromagnetic material or a ferrite on the probe portion (Page 6, Paragraph [0080]).

It would have been obvious to a person of ordinary skill in the art to modify KE1 in view of KE2 to include replacing the ferromagnetic material of the probe with a ferrimagnetic material given the above disclosure and teaching of Kitazawa et al. in order to have a probe that includes a magnetic substance for use as an magnetic force microscope.

As to Claim 8,

KE1 in view of KE2 does not explicitly disclose the probe includes a Gd-Fe alloy, a Tb-Fe alloy, a Tb-Co alloy, a Dy-Fe alloy, or a Dy-Co alloy, and replacing the ferromagnetic material of the probe with a ferrimagnetic material including one of these alloys.

KE1 discloses the use of Gd-Co as a magnetic material.

Kitazawa et al. discloses forming a ferromagnetic material or a ferrite on the probe portion (Page 6, Paragraph [0080]).

It would have been obvious to a person of ordinary skill in the art to modify KE1 in view of KE2 to include replacing the ferromagnetic material of the probe with a ferrimagnetic material including Gd-Co given the above disclosure and teaching of Kitazawa et al. in order to have a probe that includes a magnetic substance for use as an magnetic force microscope.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kado et al. (6,101,164) Embodiment One (KE1) in view of Kado et al. (6,101,164) Embodiment Two (KE2) and in further view of Farina et al. (5,856,880).

KE1 in view of KE2 discloses as explained above.

KE1 in view of KE2 does not disclose oscillating the temperature of the probe over a range of values having a lower limit below a compensation temperature of the probe material and an upper limit above the compensation temperature.

Farina et al. discloses oscillating the temperature of material over a range of values having a lower limit below a compensation temperature of the material and an upper limit above the compensation temperature (Column 6, Lines 48-56).

It would have been obvious to a person of ordinary skill in the art to modify KE1 in view of KE2 to include oscillating the temperature of the probe over a range of values having a lower limit below a compensation temperature of the probe material and an upper limit above the compensation temperature given the above disclosure and

teaching of Farina et al. in order to increase functionality by selectively controlling the magnetic sensitivity of the probe.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kado et al. (6,101,164) Embodiment One (KE1) in view of Kado et al. (6,101,164) Embodiment Two (KE2) and in further view of Nakayama et al. (2002/0110177).

KE1 in view of KE2 discloses as explained above.

KE1 in view of KE2 does not disclose coupling a current source to the probe, and applying a current to the probe.

Nakayama et al. discloses coupling a current source to the probe, and applying a current to the probe ((Figure 9) and (Page 1, Paragraphs [0007] and [0011])).

It would have been obvious to a person of ordinary skill in the art to modify KE1 in view of KE2 to include coupling a current source to the probe, and applying a current to the probe as taught by Nakayama et al. in order to have information recorded on thermal recording medium (Page 1, Paragraph [0012]).

7. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura (6,504,365) in view of Kado et al. (6,101,164).

As to Claim 18,

Kitamura discloses a cantilever that oscillates (Column 4, Lines 13-18), wherein the cantilever has a first end and a second end (Figure 2), a probe coupled to the second end of the cantilever (Figure 2), a laser adapted for illuminating the second

end of the cantilever (Figure 2), and an optical detector adapted for detecting light reflected by the cantilever (Figure 2).

Kitamura does not disclose a heat source adapted for heating the probe, and wherein the probe has a tip including a low Curie temperature material.

Kado et al. discloses a heat source (Laser) adapted for heating the probe (Column 17, Lines 60-64), and a probe tip including a ferromagnetic material that has a low Curie temperature ((Column 22, Lines 48-52) and (Figure 14)).

It would have been obvious to a person of ordinary skill in the art to modify Kitamura to include a heat source adapted for heating the probe, and wherein the probe has a tip including a low Curie temperature material given the above disclosure and teaching of Kado et al. in order to improve the magnetic sensitivity of the probe and to extend the life of the probe (see Column 6, Lines 32-39 for information regarding extending the life of the probe).

As to Claim 19,

Kitamura does not disclose the heat source is a time-varying heat source adapted to modulate heat to the probe.

Kado et al. discloses the heat source is a time-varying heat source (Laser) adapted to modulate heat to the probe (Column 17, Lines 60-64).

It would have been obvious to a person of ordinary skill in the art to modify Kitamura to include the heat source is a time-varying heat source adapted to modulate heat to the probe as taught by Kado et al. in order to use a laser to heat the probe.

8. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitazawa et al. (2002/0178799) in view of Kado et al. (6,101,164).

As to Claim 20,

Kitazawa et al. discloses a cantilever that oscillates, the cantilever having a first end and a second end ((Figure 2) and (Page 1, Paragraph [0006])), a probe coupled to the second end of the cantilever, the probe having a tapered tip including a ferrimagnetic material ((Figure 2) and (Page 6, Paragraph [0080])), and a motion detector adapted for detecting deflection of the cantilever (Page 1, Paragraph [0006]).

Kitazawa et al. does not disclose a heat source adapted for heating the probe.

Kado et al. discloses a heat source adapted for heating the probe (Column 17, Lines 62-64).

It would have been obvious to a person of ordinary skill in the art to modify Kitazawa et al. to include a heat source adapted for heating the probe as taught by Kado et al. order to extend the life of the probe (Column 6, Lines 31-36).

As to Claim 21,

Kitazawa et al. does not disclose the heat source is a time-varying heat source adapted to modulate heat the probe.

Kado et al. discloses the heat source is a time-varying heat source (Laser) adapted to modulate heat to the probe (Column 17, Lines 60-64).

It would have been obvious to a person of ordinary skill in the art to modify Kitamura to include the heat source is a time-varying heat source adapted to modulate heat to the probe as taught by Kado et al. in order to use a laser to heat the probe.

Allowable Subject Matter

9. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is an examiner's statement of reasons for allowance:

As to Claim 15,

The primary reason for the allowance of claim 15 is the inclusion of the probe includes a transparent material coated with the magnetic coating. It is these features found in the claim, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: 1) article entitled "Ferromagnetism" from Wikipedia.org which discloses information about ferromagnetism, and 2) U.S. Pat. 5,880,661 to Davidson et al. which discloses information about ferromagnetic materials (see lines 21-37 of column 1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Schindler whose telephone number is (571) 272-2112. The examiner can normally be reached on M-F (8:00 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Schindler
Examiner
Art Unit 2862

DS